

Claims

1. A media source (101; 400)
- being capable of sending out time-stamped media data packets (1021, 1022; 308; 610S, 610R; 76, 77), in particular to one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9, the
 - 5 timestamp (611S) of each media data packet (1021, 1022; 308; 610S, 610R; 76, 77) being indicative for the time of creation of the respective media data packet (1021, 1022; 308; 610S, 610R; 76, 77),
 - being adapted for determining a play-out time offset (604S), and
 - being adapted for sending out the play-out time offset (604S), in
 - 10 particular to said one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9.
2. The media source (101; 400) according to claim 1,
- characterized by**
- 15 - a sample clock being capable of determining a sample clock time,
 - being capable of determining a global wallclock time (201), and
 - being adapted for sending out a control packet (606S) once in a while,
 - in particular to said one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9, said control packet (606S) comprising
 - 20 two control packet timestamps indicating the same moment in time, the first control packet timestamp (608S) of which being measured or defined in time units of said global wallclock time (201), the second control packet timestamp (607S) of which being measured or defined in time units of said sample clock time.
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3. The media source (101; 400) according to claim 1 or 2,
- characterized in that**
- said timestamp (611S) of a media data packet (1021, 1022; 308; 610S, 610R; 76, 77) is indicative for the time of creation of said time-stamped media
 - 30 data packet (1021, 1022; 308; 610S, 610R; 76, 77) in time units of said sample clock time.
4. The media source (101; 400) according to anyone of the preceding claims,
- which is designed for sending out the same media data packets (1021,
 - 35 1022; 308; 610S, 610R; 76, 77) to two or more different receiving media sinks

(1, 2; 4021, 4022; 71, 72).

5. A media sink (1, 2; 4021, 4022; 71, 72)

- adapted for receiving time-stamped media data packets (1021, 1022;
5 308; 610S, 610R; 76, 77), in particular from a media source (101; 400)
according to anyone of claims 1 to 4,

being adapted for

- determining a play-out time offset (604R),

- precisely determining a global wallclock time (201),

10 - determining a common play-out time for each received time-stamped
media data packet (1021, 1022; 308; 610S, 610R; 76, 77) by adding the time
indicated by the timestamp (611R) of said timestamped media data packet
(1021, 1022; 308; 610S, 610R; 76, 77) and said play-out time offset (604R), and

- playing-out each received time-stamped media data packet (1021, 1022;
15 308; 610S, 610R; 76, 77) exactly when the determined common play-out time for
the received time-stamped media data packet (1021, 1022; 308; 610S, 610R; 76,
77) is reached.

6. The media sink (1, 2; 4021, 4022; 71, 72) according to claim 5,

20 which is adapted for receiving said play-out time offset (604R) once, in
particular from a media source (101; 400) according to anyone of claims 1 to 4.

7. The media sink (1, 2; 4021, 4022; 71, 72) according to claim 5,

25 which is adapted for negotiating said play-out time offset (604R) with at
least one other media sink (1, 2; 4021, 4022; 71, 72) according to claim 5 or 6.

8. The media sink (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5
to 7,

characterized by

30 being capable of

- receiving a control packet (606R), in particular from a media source
(101; 400) according to anyone of claims 1 to 4, containing a first control packet
timestamp (608R) indicating a certain moment in time measured or defined in
time units of a sample clock time and a second control packet timestamp (607R)
35 indicating the same certain moment in time measured or defined in time units of
a global wallclock time (201), and of

- converting a time indicated by a timestamp (611R) of a time-stamped

media data packet (1021, 1022; 308; 610S, 610R; 76, 77) measured or defined in units of a sample clock time into a time measured or defined in units of a global wallclock time (201), based on the information of the first and second control packet timestamp.

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9. The media sink (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 8,

characterized by

a buffer which is adapted for storing media data packets (1021, 1022;
10 308; 610S, 610R; 76, 77) until said common play-out time is reached.

10. A media processing system

characterized by

a media source (101; 400) according to anyone of claims 1 to 4 and a media
15 sink (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9.

11. A media source (501)

- being adapted for determining a play-out time offset and for determining
a common play-out time by adding the determined play-out time offset to a
20 current time, and

- being adapted for sending out time-stamped media data packets (511) to
one or more receiving media sink(s) (502), the timestamp (512) of a time-
stamped media data packet (511) being indicative for said common play-out time
of the media data packet.

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12. The media source (501) according to claim 11,

characterized by

- a sample clock being capable of determining a sample clock time, and
- being adapted for calculating said current time by reading a global
30 wallclock time (201) only once and adding time periods given by said sample
clock to the only once read global wallclock time (201).

13. The media source (501) according to claim 11 or 12,

which is adapted for sending out the same media data packets (511) to
35 two or more different receiving media sinks (502).

14. A media sink (502)

being adapted for receiving time-stamped media data packets (514), in particular from a media source (501) according to anyone of claims 11 to 13, and

being capable of

- 5 - precisely determining a global wallclock time (201), and
 - determining a common play-out time for each received time-stamped media data packet (514) which is the time indicated by the timestamp (515) of the time-stamped media data packet (514).

- 10 15. The media sink (502) according to claim 14,
 characterized by
 a buffer which is adapted for storing media data packets (514) until said common play-out time is reached.

- 15 16. A media processing system
 characterized by
 a media source (501) according to anyone of claims 11 to 13 and a media sink (502) according to anyone of claims 14 to 15.

- 20 17. A method for playing-out media data packets (1021, 1022; 308; 610S, 610R; 76, 77) synchronously, intended for a media source (101; 400), comprising the following steps
 - sending out time-stamped media data packets (1021, 1022; 308; 610S, 610R; 76, 77), in particular to one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9, the timestamp (611S) of each
25 media data packet (1021, 1022; 308; 610S, 610R; 76, 77) being indicative for the time of creation of the respective media data packet (1021, 1022; 308; 610S, 610R; 76, 77),
 - determining a play-out time offset (603S), and
30 - sending out the play-out time offset (604S), in particular to said one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9.

18. The method according to claim 17,
35 **characterized by** the following steps,
 - determining a sample clock time,
 - determining a global wallclock time (201), and

- sending out a control packet (606S) once in a while, in particular to said one or more receiving media sink(s) (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9, said control packet (606S) comprising two control packet timestamps indicating the same moment in time, the first control packet timestamp (608S) of which being measured or defined in time units of said global wallclock time (201), the second control packet timestamp (607S) of which being measured or defined in time units of said sample clock time.

19. The method according to claim 17 or 18,
10 **characterized in that**

said timestamp (611S) of a media data packet (1021, 1022; 308; 610S, 610R; 76, 77) is indicative for the time of creation of said time-stamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) in time units of said sample clock time.

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20. The method according to anyone of claims 17 to 19,
characterized by

sending out the same media data packets (1021, 1022; 308; 610S, 610R; 76, 77) to two or more different receiving media sinks (1, 2; 4021, 4022; 71, 72).

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21. A method for playing-out media data packets (1021, 1022; 308; 610S, 610R; 76, 77) synchronously, intended for a media sink (1, 2; 4021, 4022; 71, 72), comprising the following steps

- receiving time-stamped media data packets (1021, 1022; 308; 610S, 610R; 76, 77), in particular from a media source (101; 400) according to anyone of claims 1 to 4,

- determining a play-out time offset (604R),
- precisely determining a global wallclock time (201),
- determining a common play-out time for each received time-stamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) by adding (614R) the time indicated by the timestamp (611R) of said timestamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) and said play-out time offset (604R), and
- playing-out each received time-stamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) exactly when the determined common play-out time for the received time-stamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) is reached (616R).

22. The method according to claim 21,
characterized by the step of
receiving said play-out time offset (604R) once, in particular from a media
source (101; 400) according to anyone of claims 1 to 4.

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23. The method according to claim 21,
characterized by the step of
negotiating said play-out time offset (604R) with at least one other media
sink (1, 2; 4021, 4022; 71, 72) according to anyone of claims 5 to 9.

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24. The method according to anyone of claims 21 to 23,
characterized by the following steps,
- receiving a control packet (606S), in particular from a media source
(101; 400) according to anyone of claims 1 to 4, containing a first control packet
15 timestamp (608R) indicating a certain moment in time measured or defined in
time units of a sample clock time and a second control packet timestamp (607R)
indicating the same certain moment in time measured or defined in time units of
a global wallclock time (201), and of
- converting a time (613R) indicated by a timestamp (611R) of a time-
20 stamped media data packet (1021, 1022; 308; 610S, 610R; 76, 77) measured or
defined in units of a sample clock time into a time measured or defined in units
of a global wallclock time (201), based on the information of the first and second
control packet timestamp.

25 25. The method according to anyone of claims 21 to 24,
characterized by the step of
storing media data packets (1021, 1022; 308; 610S, 610R; 76, 77) in a
buffer until said common play-out time is reached (615R).

30 26. A method for playing-out media data packets (1021, 1022; 308; 610S,
610R; 76, 77) synchronously, intended for a media processing system,
characterized by
the steps of the method according to anyone of claims 17 to 20 and the steps
of the method according to anyone of claims 21 to 25.

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27. A method to enable the synchronous play-out of media data packets
(511), intended for a media source (501), comprising the following steps

- determining a play-out time offset and a common play-out time by adding the determined play-out time offset to a current time, and

- sending out time-stamped media data packets (511), in particular to one or more receiving media sink(s) (502) according to claim 14 or 15, the timestamp
5 (512) of a time-stamped media data packet being indicative for said common play-out time of the media data packet.

28. The method according to claim 27,

characterized by the steps of

10 - determining a sample clock time, and

- calculating said current time by reading a global wallclock time (201) only once and adding time periods given by said sample clock to the only once read global wallclock time (201).

15 **29.** The method according to claim 27 or 28,

characterized by the step of

sending out the same media data packets (511) to two or more different receiving media sinks (502).

20 **30.** A method for playing-out media data packets (514) synchronously, intended for a media sink (502), comprising the following steps

- receiving time-stamped media data packets (514), in particular from a media source (501) according to anyone of claims 11 to 13,

- precisely determining a global wallclock time (201), and

25 - determining a common play-out time for each received time-stamped media data packet (514) which is the time indicated by the timestamp (515) of the time-stamped media data packet (514).

31. The method according to claim 30,

30 **characterized by** the step of

storing media data packets (514) in a buffer until said common play-out time is reached.

32. A method to enable the synchronous play-out of media data packets (511,
35 514), intended for a media processing system,

characterized by

the steps of the method according to anyone of claims 27 to 29 and the steps

of the method according to claim 30 or 31.